

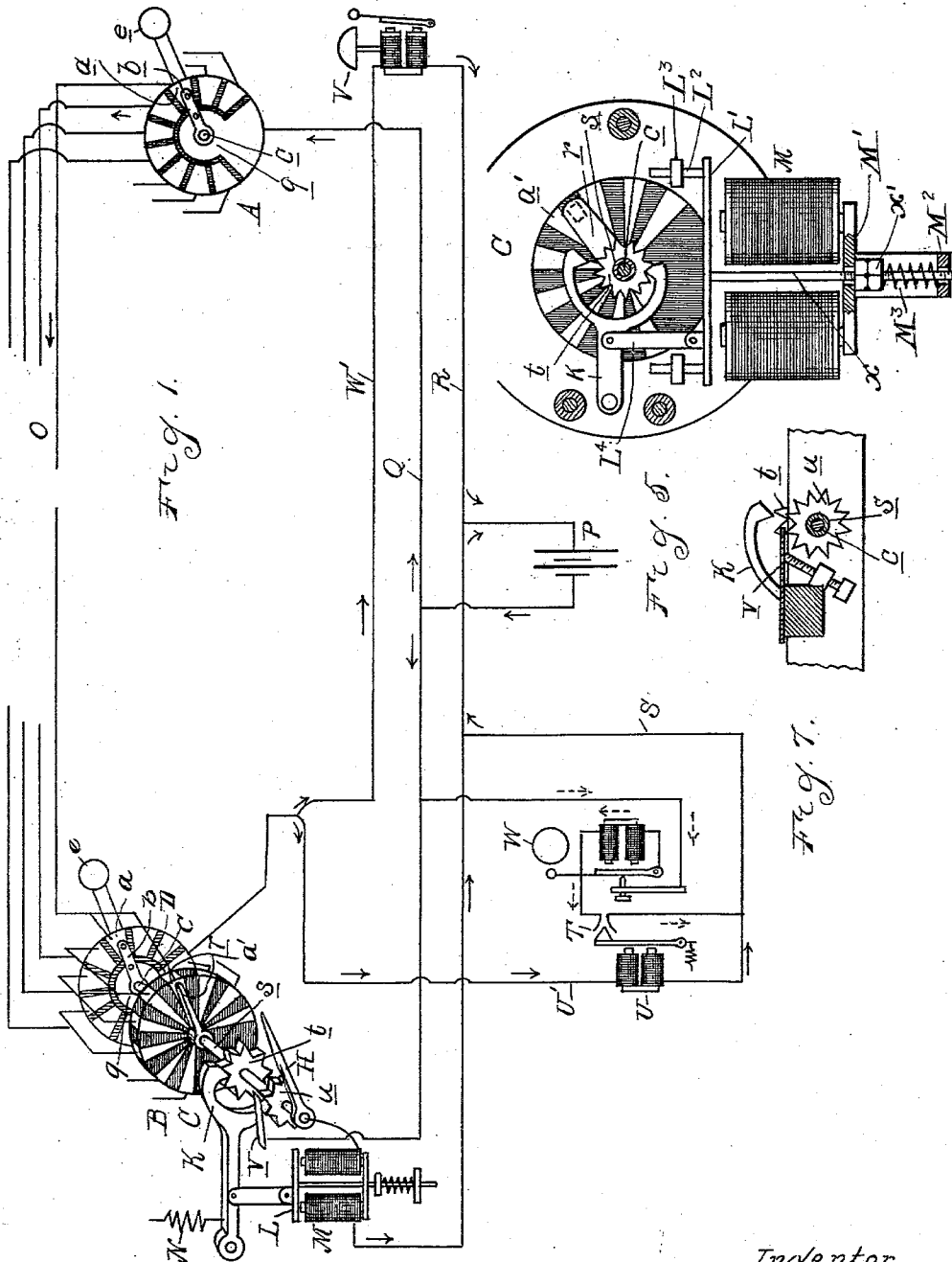
No. 748,941.

PATENTED JAN. 5, 1904.

H. A. FESSENDEN.
ELECTRIC SIGNAL SYSTEM.
APPLICATION FILED DEC. 16, 1901.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses
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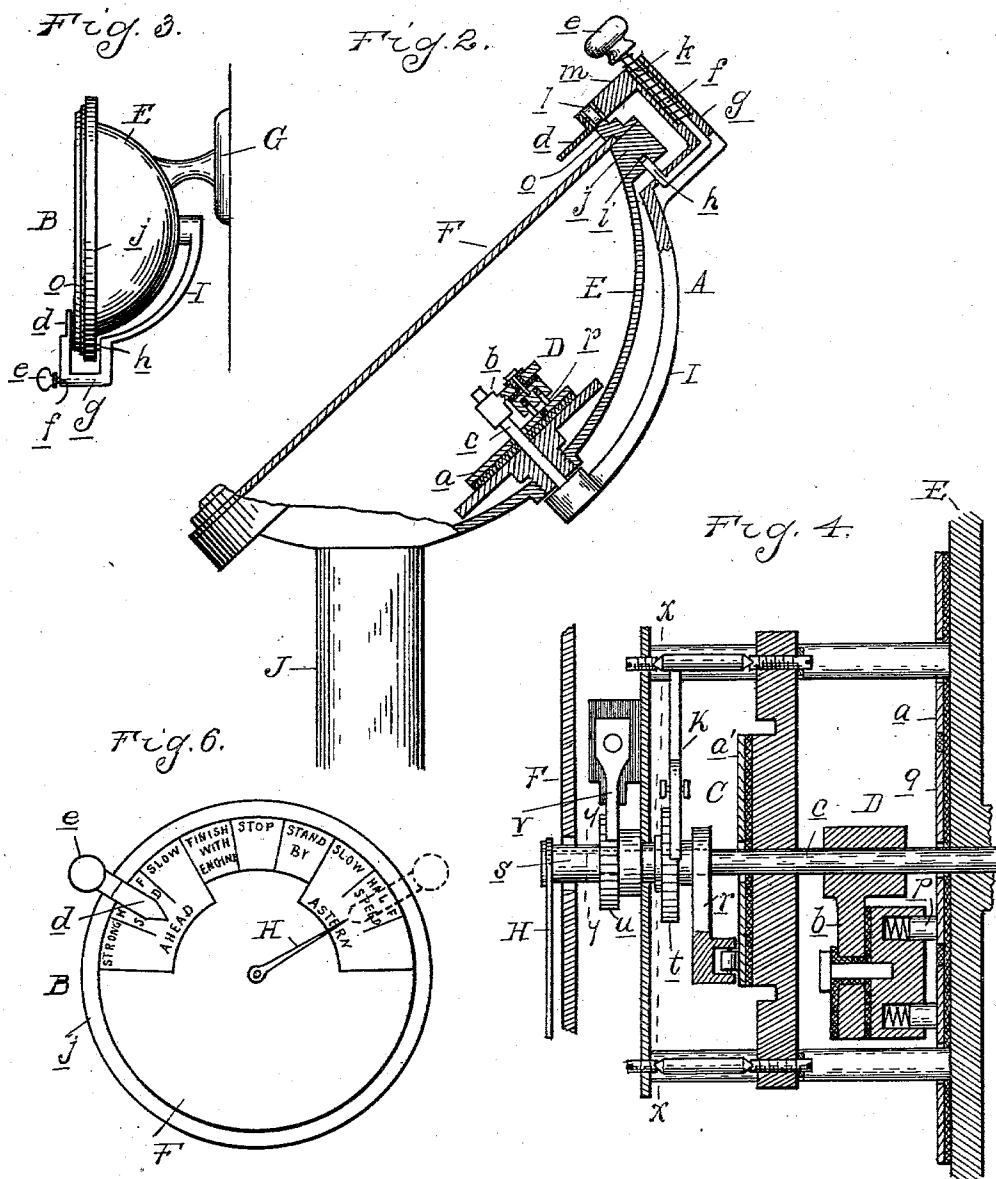
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UNITED STATES PATENT OFFICE.

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ELECTRIC SIGNAL SYSTEM.

SPECIFICATION forming part of Letters Patent No. 748,941, dated January 5, 1904.

Application filed December 16, 1901. Serial No. 86,171. (No model.)

To all whom it may concern:

Be it known that I, HOWARD A. FESSENDEN, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Electric Signal Systems, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to electric signal systems of that type in which a plurality of different signals may be sent from one station to another and a return-signal sent from the latter point to the former, apprising the sender that the signal has been understood.

It is the object of the invention to guard against possibility of mistake either on the part of the operator sending or the one receiving the signal, and it is a further object to avoid unnecessary complications or the use of mechanisms which are likely to get out of order.

With these objects in view the invention consists in a novel system in which an alarm is arranged at the receiving-station to be started in continuous operation by the transmission of any signal from the distant station, the operation of said alarm being stopped by the sending of the corresponding return-signal.

The invention further consists in the peculiar arrangement and combination of parts, as hereinafter described and claimed.

In the drawings, Figure 1 is a diagram of the system. Fig. 2 is a vertical longitudinal section through the instrument for one station. Fig. 3 is an elevation of the instrument at the opposite station. Fig. 4 is a plan of a portion of the mechanism included in the latter instrument slightly modified from the construction shown in Fig. 1. Fig. 5 is a section on line *x x*, Fig. 4. Fig. 6 is a front elevation of the receiving instrument. Fig. 7 is a section on line *y y*, Fig. 4.

A is the instrument at the station from which the signal is first transmitted, and B the instrument at the opposite station. The latter preferably comprises an indicator or visual signal C and a transmitter D for the return-signal. As shown in Fig. 4, these two instruments are preferably arranged in a com-

mon casing E, which is provided at its front with a dial F, having a series of indications thereon and a traveling index-hand H for designating the particular signal. The casing E is preferably provided with a bracket G for securing it to the wall or other suitable support and is also provided with a handle I for operating the return-signal transmitter. The latter comprises a segmental series of contacts *a* and a traveling contact *b*, which is secured to a rock-shaft *c*, journaled in the casing and to which the handle I is attached. This handle is preferably arranged outside of the casing and extends to the periphery of the dial, where it is provided with an index *d* for designating the particular indication on the dial. In order to lock the handle in different position of adjustment, a locking-latch is provided, preferably constructed as shown and comprising a knob *e*, secured to the shank *f*, slidably secured in a tubular bearing *g* at the end of the handle I. The end of the shank *f* is bent to form a hook *h*, which is adapted to engage with a series of apertures *i*, formed in a flange *j* in the casing. *k* is a spring acting upon the shank *f* and adapted to throw said hook into engagement with said aperture when in registration therewith.

The parts as just described are so arranged that by pressing upon the knob *e* the hooks *h* will be disengaged from the aperture *i* in the flange *j*, so as to permit of turning the handle I into the desired position, whereupon the handle will be again locked by the reengagement of the hook with the corresponding aperture.

In order to relieve the strain upon the shaft *c*, caused by the pressure on the knob *e*, an antifriction-roll *l* is preferably secured to an arm *m*, projecting from the bearing *g*. This antifriction-roll is adapted to travel upon a flange *o*, which takes the thrust due to the pressure on the knob *e*. The traveling contact *b* is preferably in the form of an insulated bridge secured to a rock-arm on the shaft *c* and having spring-pressed contacts *p*, respectively bearing upon the contacts *a*, and a common circular contact *q*.

The construction thus far described is the same in both the transmitter D of the instru-

ment B and in the instrument A. The latter is, however, preferably mounted upon a vertical post J instead of being provided with the bracket G, and this instrument is also
5 unprovided with the index H.

The instrument C comprises a segmental series of contacts a' , corresponding to the contacts a , and a traveling contact r , secured to a shaft s . This shaft is preferably of tubular form and, as shown in Figs. 4 and 5, is
10 sleeved upon an extension of the shaft c , but is disconnected therefrom. The index H is secured to the outer end of the shaft s , and intermediate said index and the series of segmental contacts a' are arranged a ratchet-wheel t and a contact-wheel u .
15

K is a double pawl for actuating the ratchet-wheel t and which is connected to the armature L of an electromagnet M, the arrangement being such that the movement of
20 the armature drawn in one direction by the magnet M and in the opposite direction by a spring N will cause the step-by-step rotation of the ratchet-wheel t and through the shaft s a similar movement of the traveling contact r , contact-wheel u , and index H. The contact-wheel u coöperates with the stationary arm v and is adapted to break connection therewith whenever the armature L is attracted by the magnet M.
30

The mechanism of the instrument being constructed as described, the arrangement of circuits is as follows: The corresponding contacts a of the two transmitting instruments
35 A and D are connected with each other by a multiple of electric conductors O, extending from one station to the other. The corresponding contacts a and a' of the instrument D and C are also connected.

P is an electric generator, and Q and R are conductors leading from the poles of said generator and extending to each station. The conductor Q is connected to the common contact q of the instrument A and at the opposite station connected with the stationary
45 contact v , which coöperates with the contact-wheel u . The conductor R constitutes a common return-conductor and may, if desired, be omitted where a ground-circuit is employed. At the instrument B the conductor R is connected with one terminal of the electromagnet M, while the opposite terminal thereof is connected, through the mechanism, with the traveling contact r and
55 the contact-wheel u .

W is an alarm at the station of the instrument B, which, as shown, has a continuous-ringing bell arranged in a local normally open electric circuit S between the conductors Q and R.
60

T is a circuit-closer of the circuit S, which is normally held open by an electromagnet U. The latter is arranged in an electric connection U' between the contact q of the instrument D and the return-conductor R.
65

V is an alarm or signal at the station of the instrument A, which is preferably a single-

stroke bell included in an electric circuit between the line R and the conductor W', which latter extends to the station of the instrument D and is connected with the contact q thereof. The electric connection being arranged, as described, in normal position of the instruments in which the traveling contacts b and r are in connection with the corresponding contacts a and a' , the following electric circuits will be established: One circuit is completed through the conductor Q and its connection with the common contact q of the instrument A, the traveling contact b , the segmental contact a , the line O, the contacts a' and r of the instrument C, the magnet M, and the return-conductor R. Another circuit is completed through the same connections to the conductor O and thence through
85 the contacts a and b of the instrument D, the contacts q thereof, the connection U', magnet U, and return-conductor R. A third circuit is completed through the connections last described to the contact q of the instrument D, thence through the conductor W' and bell-magnet V and return-conductor R. In addition to the circuits above set forth is a circuit which is open in the normal condition of parts and comprises the conductor Q,
95 extending to the instrument C, and the contact v , which latter is, however, separated from its coöperating contact-wheel u . When in connection therewith, the circuit is completed through the magnet M and return-conductor R.
100

The operation of the system is as follows: The operator at the instrument A desiring to send one of the signals to the operator at the instrument B moves the handle I into a position where the index d will point to the corresponding indication on the dial of his instrument. This movement of the handle I will cause the contact b to shift its position to another one of the contacts a . In so doing the electric circuits which are established through the conductor O will be broken, thereby deenergizing both the magnets M and U. The latter will release the circuit-closer T, which will automatically close the electric circuit S of the bell W. This bell being of the continuous-ringing type will sound an alarm, which will continue so long as the circuit-closer T remains closed. The deenergizing of the magnet M will permit the spring N to retract the armature L and through one arm of the pawl K will cause a sufficient rotation of the ratchet-wheel t to close contact between the contact-wheel u and contact v . This will immediately reestablish a circuit through the magnet M, causing a further rotation of the ratchet-wheel t , which in turn will move the contact-wheel u to again break contact. Thus a step-by-step movement will be imparted to the shaft s and traveling contact r secured thereto. The contact r will continue to travel until the particular contact a' is reached which corresponds to the contact a to which the contact b of the instrument A was moved. When
130

this point is reached, a circuit will again be established through the corresponding conductor O, which includes the electromagnet M and excludes the make-and-break contact u and v , thereby arresting movement of the mechanism. When the movement of the shaft s and contact r is arrested, the index H of the instrument C will point to that indication upon the dial corresponding to one on the instrument A, which is indicated by the index d . The alarm W will, however, continue in operation until the correct return-signal is given. This is made by moving the handle of the instrument B until the contact b closes with that one of the contacts a corresponding to the closed contact of the instrument A. This will reestablish the circuit which passes through the instruments A and D and the connecting conductor O, and thence through the conductor U' and magnet U to the return-line R. As soon as this circuit is established the magnet U will be again energized, which will open the circuit-closer T of the circuit S and stopping the alarm W. At the same time a circuit is reestablished through the conductor W' and magnet of the bell V and the return-conductor R, which will sound said bell V, indicating to the operator at the instrument A that the correct signal has been received.

Inasmuch as the bell V cannot be sounded unless the handle of the instrument D has been moved to a point corresponding to the handle of the instrument A it is unnecessary to have a plurality of different return-signals.

It is desired to call special attention to the fact that the operation of the alarm W and of the return-signal mechanism is entirely independent of the receiving instrument or indicator C. Thus should the latter instrument fail to operate through any disarrangement of its mechanism or from any other cause and a false indication be thereby given this cannot deceive the operator at that end of the line. In such an event if the operator attempts to sound the return-signal corresponding to the false indication he will be made aware of the inaccuracy of the indication by the fact that the alarm continues to operate. By then continuing to move the handle I of his instrument he will at length reach the corresponding position to the instrument A, which will immediately stop the alarm and sound the return-signal. When the alarm is stopped, the position of the index d will show the operator what signal was sent.

In order to prevent possibility of stopping the alarm by a circuit passing through the contact R of the instrument C, the latter is always moved out of contact from the segmental contact a' whenever the armature L is retracted. This is effected by separating the contacts a' from each other sufficiently, as shown in Fig. 1.

In Fig. 5 is shown a construction of step-by-step actuation mechanism which is preferably employed in the instrument C. In

this the magnet M is arranged directly beneath the shaft s , and the armature L' is provided with a vertical central shank x , which passes through the connecting-bar M' of the magnet and is guided therein and in a bearing M² beneath. L² represents pins projecting upward from the armature and guided in bearings L³. L⁴ is a link connecting the armature L' to the pawl K intermediate its pivot and the portion engaging the ratchet-wheel. M³ is a spring sleeved upon the shank x , one end bearing against the bearing M² and the other end against an adjustable collar x' on the shank x . In operation the magnetic pull will move the armature equally in relation to each pole of the magnet, and the link L⁴ will transmit its movement to the pawl. When the magnet is de-energized, the spring m^2 will retract the armature and actuate the pawl in the reverse direction.

What I claim as my invention is—

1. An electric signal system comprising transmitters at different stations for a plurality of corresponding signals, an alarm at one station adapted to operate continuously, an electromagnet controlling said alarm and a circuit therefor, extending to the transmitters at different stations and means for respectively closing and opening said circuit whenever said transmitters are in or out of registration with each other.

2. An electric signal system comprising an alarm at one station, means for starting said alarm in continuous operation by the transmission of any one of a plurality of signals from a distant station, means at said alarm-station for stopping said alarm by an operation corresponding to the signal sent, a signal at the distant station, and means automatically operating upon the operation of stopping said continuous alarm for causing a momentary operation of the signal at the distant station signifying that the correct signal has been received at the alarm-station.

3. An electric signal system comprising an alarm at one station adapted to operate continuously, a controlling electric circuit therefor adapted when closed to stop said alarm from operating and having a plurality of branches extending between the said station and a distant station, said branches corresponding respectively to a plurality of different signals, and signal instruments at the different stations controlling the coupling of said electric circuit, said instruments being adapted when out of correspondence to open said circuit and thereby permit said alarm in continuous operation, and when in correspondence to stop said alarm.

4. In a signal instrument, the combination with an electromagnet, of a vibratory pawl actuated in one direction by said magnet, a ratchet-wheel with which said pawl engages, a star-contact wheel rotated by said ratchet-wheel and having a corresponding number of

teeth, a cooperating contact and an electric circuit including said magnet, contact-wheel and cooperating contact; the arrangement being such that the electromagnetic actuation
5 of said pawl will rotate said contact-wheel to break with its cooperating contact, and the opposite movement of said pawl will further rotate said contact-wheel to bring the suc-

ceeding tooth thereof against said cooperating contact. 10

In testimony whereof I affix my signature in presence of two witnesses.

HOWARD A. FESSENDEN.

Witnesses:

M. B. O'DOHERTY,

H. C. SMITH.